

**WHAT IS CLAIMED IS:**

1    1. An engine torque estimating apparatus comprising:  
2       fuel supply stopping means for stopping fuel supply  
3       to an internal combustion engine when a predetermined  
4       engine operating condition is satisfied; and

5       engine torque estimating means for estimating a  
6       torque generated by the engine, the engine torque  
7       estimating means comprising,

8              a first engine torque estimating section for  
9       estimating the torque generated by the engine when  
10      the fuel supply stopping means is in an inoperative  
11      state, and

12             a second engine torque estimating section for  
13       estimating the torque generated by the engine when  
14       the fuel supply stopping means is in an operative  
15       state.

1    2. The engine torque estimating apparatus as claimed in  
2       claim 1, wherein the first engine torque estimating section  
3       comprises a first engine torque map which has set the  
4       engine torque according to the engine speed and the engine  
5       load, and the second engine torque estimating section  
6       comprises a second engine torque map which has set the  
7       engine torque according to the engine speed.

1    3. The engine torque estimating apparatus as claimed in  
2       claim 2, wherein the second engine torque map is a  
3       two-dimensional map which is defined by the engine speed  
4       and a negative engine torque corresponding to a pumping  
5       loss of the engine.

1   4.   The engine torque estimating apparatus as claimed in  
2 claim 1, wherein the engine torque estimated by the second  
3 engine torque estimating section is a negative engine  
4 torque.

1   5.   The engine torque estimating apparatus as claimed in  
2 claim 1, wherein the predetermined engine operating  
3 condition includes a condition that an accelerator opening  
4 of the engine is put in a full close state, that a vehicle  
5 speed of the vehicle equipped with the engine is greater  
6 than or equal to a predetermined vehicle speed and that an  
7 engine speed is greater than or equal to a predetermined  
8 engine speed.

1   6.   The engine torque estimating apparatus as claimed in  
2 claim 1, further road gradient estimating means for  
3 estimating a gradient of a road, on which a vehicle  
4 equipped with the engine is traveling, from the estimated  
5 torque and shift controlling means for controlling an  
6 automatic transmission upon taking account of the gradient.

1   7.   A method of estimating a torque generated by an  
2 internal combustion engine, comprising the steps of:  
3         determining whether fuel supply to the engine is  
4 executed; and  
5         estimating an engine torque generated by the engine on  
6 the basis of a second engine torque map which is a  
7 two-dimensional map defined by an engine speed and a  
8 negative engine torque, when the fuel supply is not  
9 executed.

1    8. The method as claimed in claim 7, further comprising a  
2    step of estimating the engine torque on the basis of a  
3    first engine torque map for defining the engine torque  
4    according to the engine speed and the engine load when the  
5    fuel supply to the engine is executed.

1    9. The method as claimed in claim 7, further comprising a  
2    step of estimating a gradient of a road, on which a vehicle  
3    equipped with the engine is traveling, from the estimated  
4    torque, and a step for controlling the automatic  
5    transmission upon taking account of the gradient.

1    10. An engine torque estimating apparatus connected to an  
2    automatic transmission and an internal combustion engine,  
3    the engine torque estimating apparatus comprising:

4         a control unit arranged,

5         to stop a fuel supply to the engine when a  
6         predetermined engine operating condition is satisfied,

7         to estimate a torque generated by the engine  
8         using a first map which has defined the torque  
9         according to an engine speed and an intake air flow of  
10      the engine when the fuel supply to the engine is  
11      executed, and

12         to estimate the torque using a second map which  
13         has defined the torque according to the engine speed  
14         when the fuel supply to the engine is stopped.

1    11. The engine torque estimating apparatus as claimed in  
2    claim 10, wherein the control unit includes an automatic  
3    transmission control unit for controlling the automatic  
4    transmission and an engine control unit for controlling the  
5    engine.

1   12. The engine torque estimating apparatus as claimed in  
2   claim 10, wherein the control unit is further arranged to  
3   estimate a gradient of a road, on which a vehicle equipped  
4   with the engine is traveling, from the estimated torque,  
5   and to control the automatic transmission upon taking  
6   account of the gradient.

1   13. The engine torque estimating apparatus as claimed in  
2   claim 10, further comprising an air flow sensor for  
3   detecting an intake air flow, a vehicle speed sensor for  
4   detecting the vehicle speed, an engine speed sensor for  
5   detecting the engine speed, and an accelerator sensor for  
6   detecting an accelerator opening, which are connected to  
7   the control unit.